Effects of feeding different postbiotic metabolite combinations produced by Lactobacillus plantarum strains on egg quality and production performance, faecal parameters and plasma cholesterol in laying hens

ABSTRACT

Background: Probiotics are beneficial bacteria that are able to colonize the host digestive system, increasing the natural flora and preventing colonization of pathogenic organisms and thus, securing optimal utility of the feed. However, commercial probiotic often do not meet the expected standards and the viability of the efficacy of these strains remains questionable. Another major issue has been highlighted in relation to the application of antibiotic resistant probiotics, the antibiotic resistant gene can be transferred between organisms. Recently, postbiotic metabolites produced from microbes have been extensively studied as feed additive in order to substitute in-feed antibiotics. Results: No significant difference ($P > 0.05$) was found among the treatment groups on overall feed intake, egg weight, egg mass and feed conversion efficiency. COM456 had a significant reduction ($P < 0.05$) in faecal pH compared to the other groups at 28 weeks of age onwards. COM456 had significant higher ($P < 0.05$) level of lactic acid bacteria counts from 30 weeks of age onwards, followed by COM246 and COM345 at 32 and 34 weeks of age, respectively. Significant reduction of faecal Enterobacteriaceae ($P < 0.05$) were observed in COM246 and COM456 from 30 weeks of age onwards. The lowest levels ($P < 0.05$) of plasma and egg yolk cholesterol were observed in COM456, followed by COM345 and COM246. There was no significant difference in terms of yolk weight between the treatment groups. Significant higher ($P < 0.05$) content of C18:3, C20:2 and C22:6 were found in treatments supplemented with metabolite combinations as compared with the control group. Conclusions: The present study demonstrated the positive effects of metabolite combinations supplementation in laying hens. Increase in hen-day egg production was observed in all treatments supplemented with metabolite combinations. In addition, the metabolite combinations, COM456 had reduced the faecal pH and faecal Enterobacteriaceae population, improved the faecal lactic acid bacteria, reduced the plasma and yolk cholesterol and improved the faecal volatile fatty acids content. Postbiotic metabolite combinations can be used as an alternative feed additive to achieve high productivity and better animal health while reducing the use of conventional chemotherapeutic agents such as in-feed antimicrobials.

Keyword: Laying hen; Lactobacillus plantarum; Metabolite combination; Postbiotic